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METROPOLITAN LIFE INSURANCE COMPANY

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Progress in the Control of Diabetes

DIABETES continues to be an outstanding example of the progress which modern medical science has made in combating disease. Diabetes affords also a striking picture of how scientists seize upon a new discovery; how, after thorough tests, they introduce it into practice, but, still unsatisfied, they seek to improve upon the original work, and are willing even to discard the new method altogether when a better one is discovered. Diabetes also gives a splendid illustration of how such efforts, unrestrained by geographical limits, are international in scope. Consider the outstanding landmarks in the history of diabetes research: A Frenchman, in 1846, was first to suspect the pancreatic origin of diabetes. Two German physicians proved it in 1889. An American, in 1901, and a Russian, in 1902, first showed independently that the Islands of Langerhans in the pancreas are involved. Canadians discovered insulin in 1921. A Dane, in 1935, proved the value of the addition of protamine to insulin.

The close cooperation among scientists in different fields is very well illustrated by the development of protamine zinc insulin. From a relatively crude, unstable combination of insulin and protamine, this substance has been developed within two years into a stable preparation, safe for even young children to inject. Biochemists, studying the action of protamine experimentally, showed that the addition of a small amount of zinc to the preparation improved its effectiveness considerably. By intensive work in the pharmaceutical laboratories, production methods were so far improved as to make sufficient amounts of the new preparation available at a cost low enough to bring it within the reach of all who need it. Physicians in many different places, expert in the treatment of diabetes, tried out the new preparation, and before a year had passed had gained sufficient knowledge regarding the dosage and the time of administration to warrant adopting protamine insulin into general practice. This knowledge was quickly disseminated to the entire profession.

Before discussing the role of protamine insulin in diabetes, it will be well first to review the chief features of the diabetes situation today as shown by mortality statistics of the

disease. The chart on page 3 shows the death rates among white policyholders of the Company, by sex and age, from 1911 to 1937. Of particular interest are the recent changes in these curves which, however, permit in addition a comparison with pre-insulin years.

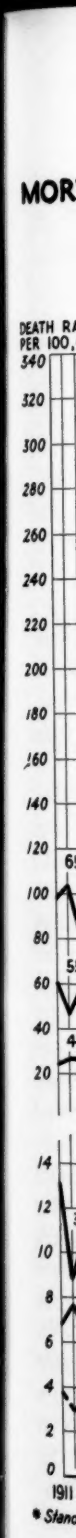
The most direct and substantial effect of insulin treatment on the diabetes death rate is seen in the drastic declines since 1922 in mortality among children and young people. Among children the actual numbers of deaths from diabetes have been so few in recent years that the variations in the death rates at these ages represent little more than chance fluctuations. Smaller declines were recorded among adult males up to age 55 and among females up to age 35. Past age 55 among men and age 45 among women, the long-term trend, even since insulin, has been upward, but during the last few years there have been, in some cases, slight decreases, and, except among women past 65, no increases. At ages 75 and over the insurance experience, although too small to give completely reliable trends, shows a recent marked increase only among females. This age group is omitted from the chart. The reasons for the increases at the older ages do not at all imply a failure of insulin, as will be discussed presently.

The striking feature of this insurance experience is that the death rate, when adjusted for changes in the age, sex, and color make-up of the group, has for the last six years been extremely stable, varying only from 20.5 to 20.8 per 100,000 between 1932 and 1937. This rate level, however, is distinctly above that prevailing prior to 1932.

The halt in the rise of diabetes mortality has taken place despite a continued increase in the number of recognized cases of the disease which, in our judgment, is still taking place. Probably the major factor is the greatly increased frequency of discovery of cases of the disease, hitherto overlooked, particularly of mild cases in later life. This has resulted from the ever-widening practice of making routine urine and blood examinations, not only of sick persons, but also of apparently well persons in the course of medical examination for Life insurance, for employment, and for periodic health check-up.

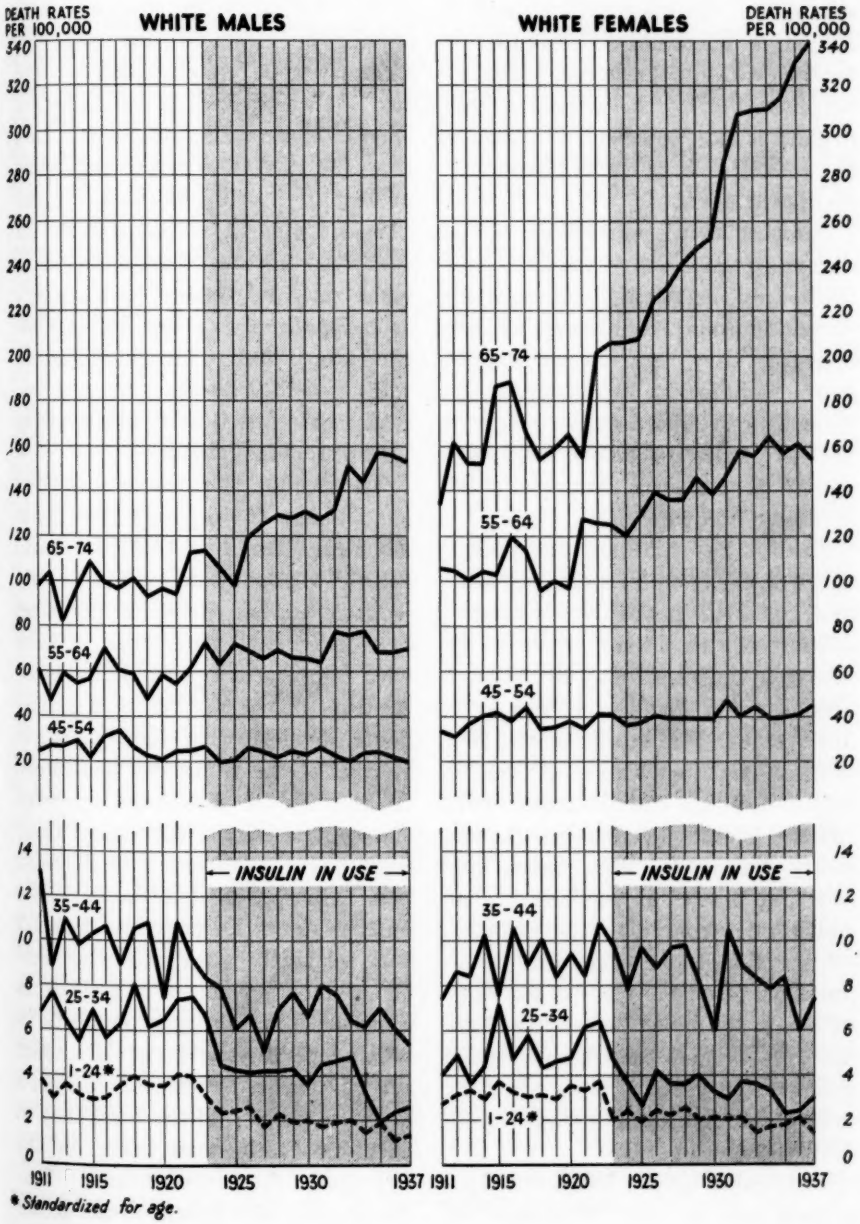
Another source of increase in the number of diabetics is the constantly growing number of persons at older ages, among whom the frequency of onset of diabetes is highest. This increase affects, however, only the crude death rate from the disease, not the adjusted rates which are used in this article when dealing with the mortality at all ages combined.

Of marked significance in the increase in the number of deaths from diabetes is our ever more-mechanized civilization, with its abundant use of labor-saving devices in the factory, on the farm, and in the home, coupled with a liberal standard of nutrition. As a result, there has been a practically continuous decline in the energy expended for



MORTALITY FROM DIABETES BY SEX AND AGE, 1911 - 1937

Metropolitan Life Insurance Company
Industrial Department



*Standardized for age.

muscular work by the average individual. Change in the dietary habits of our people continues as education in proper diet is more diffused throughout the country. An actual decline in per capita consumption of food on a calory basis has probably occurred, but it is believed that this decline is not sufficient to balance the reduction in the energy requirements for work.

Another source of increase of the diabetic population is the fact that the average length of life of diabetics is greater today than formerly and therefore they tend to accumulate in the population, especially in the older age groups, as the years go by. As a natural result of this, more deaths of diabetics occur in these older age groups.

Insulin has had an unexpected effect on the trend of mortality from diabetes. It is probably no exaggeration to say that the *recorded* death rate from diabetes today would have been lower if insulin had not been discovered. For insulin stimulated interest in diabetes so much that it helped to bring to light many more cases. Deaths in this group, formerly charged to other causes, now effect an apparent swelling of the death rate from diabetes mellitus. At the same time there can be no question but that insulin has kept in check the *actual* mortality from diabetes, because there is substantial proof of the value of insulin and its favorable effect on the longevity of diabetics.

Protamine insulin has introduced a new era in the treatment of diabetes. It may be too early to credit it with helping to keep down diabetes mortality, but its influence should soon be apparent. Large numbers of diabetics now need take insulin but once a day, whereas formerly they usually had to take two or three doses. More diabetics, therefore, are willing to use it. Lest there be any false hopes regarding protamine insulin, it must be emphasized that it is not a cure for diabetes, but an improvement in what may be termed a diabetic's artificial supply of insulin, in that the rate of flow of this modified insulin into the blood stream approximates the normal more closely than that of regular insulin.

The benefits of protamine insulin, particularly at this early stage, cannot be measured by the gross death rate in a population, which is subject to the great variety of influences just described. One must consider what happens in a group of diabetics. A study of the records of a prominent physician by the Statistical Bureau of the Company has shown that protamine distinctly improved the control of the disease in these patients. It is notable that the most positive improvement was made by older patients, those whose diabetes was relatively mild and who were thought to have less to gain from insulin than younger patients in whom the disease is usually more severe. Older diabetics form such a large proportion of the total that to them protamine can bring, in the aggregate, the largest benefit. Protamine may also permit some further

liberalization of the diet of diabetic patients.

Protamine has shown its value in a number of other ways. Most remarkable is the fact that enlargement of the liver, which was fairly common in young diabetics under regular insulin, is definitely tending to disappear. Coma is much less frequent now than with regular insulin. Surgery is made safer. With protamine it is believed that the onset and progression of arteriosclerotic complications, the chief cause of death of diabetics today, will be delayed. Protamine has enabled many diabetics to remain or again become useful and self-supporting members of society. Protamine adds to the comfort and convenience of the treatment of diabetes as well as to its effectiveness. But protamine means even more. Its success is a new stimulus to the search for yet more effective methods of treatment.

Mortality Experience of the First Three Months of 1938

AN ALMOST unbroken series of new low monthly death rates, for insured wage-earners and their dependents, began in May 1937, extended with the exception of a single month through the remainder of last year, and has continued through the first quarter of 1938.

The mortality experience of the first three months of the current year, indeed, has been so favorable that the record is beyond all expectations; for the cumulative death rate dropped to the unprecedented figure, for the first quarter of any year, of 8.5 per 1,000. The nearest approach in past years to this winter season mortality rate was 9.3 per 1,000, and was recorded for the first quarter of 1932. Thus, the death rate of this group, now consisting of 17,700,000 persons, was 8.5 percent lower this year than it has ever been during the like part of any year.

For the month of March alone the mortality rate was 8.4 per 1,000, and the nearest approach to this for any previous March was 8.7—recorded in 1933.

Reports from all over the United States also show unmistakably that the general population of the country has gotten off this year to an excellent start with respect to mortality. For example, up to the week ended April 16th, all of the large Industrial Life insurance companies combined had paid 27,903 fewer death claims than during the same weeks of last year. Again, in the general population of 86 large American cities, deaths up to the week ended April 16th numbered 18,384 less than in the like period of 1937; and provisional mortality reports for the City of New York show that up to April 23d there had been a substantial reduction as compared with 1937, not only in deaths from all causes combined, but in such important items as infant mortality and maternal mortality.

The 1,250,000 Metropolitan Industrial policyholders in Canada have also been enjoying favorable health conditions thus far in 1938, as indicated by the fact that their year-to-date death rate shows an improvement of 5.3 percent as compared with the first quarter of 1937.

It is entirely too early in the year, of course, to venture the prediction that 1938 will set a new record for low mortality among these insured wage-earners and their families. We must always reckon with weather conditions, which, obviously, cannot be foretold. They have been favorable during the winter, it is true, but if an abnormally hot and dry summer happens to be in store for the country, the mortality rate might rise considerably. Again, there is always the chance of an unforeseen epidemic which might result in thousands of deaths. But, all in all, with the excellent start that 1938 has enjoyed, it is obvious that there is a very good prospect that the death rate for the year will be lower than ever before.

For many of the individual causes of death the record for 1938 to date is particularly encouraging.

Tuberculosis

The most important development is the continuing downward swing of the tuberculosis death rate among both the white and the colored policyholders. The drop this year bids fair to be a large one. In fact, for the first time in the history of this important cross-section of the population, it now seems assured that at the end of 1938 the tuberculosis death rate for the year will be found to have fallen below 50 per 100,000. It should be borne in mind that the first quarter of the year usually records a higher tuberculosis death rate than does any other season; and for the first quarter of 1938 that death rate was only 47.7.

Influenza and Pneumonia

There has been no widespread prevalence of epidemic influenza so far this year. A considerable drop in the mortality from this disease, and from pneumonia, was expected after last year's relatively high figures, and has actually been recorded: a fall of 46 percent for the two diseases combined, of 71 percent for influenza, and of 36 percent for pneumonia. With a steadily widening application of the serum treatment in lobar pneumonia, public health workers look forward hopefully to further and material declines in the pneumonia death rate.

Diseases of Pregnancy and Childbirth

Again, there has occurred this year a decided drop in the mortality from diseases of the maternal state. The death rate from these conditions has been declining continuously among insured women since 1927. A falling birth rate has, of course, been a factor in this decrease, but there has also been a drop in the maternal mortality rate, that is, in the number of deaths of mothers per 1,000 live births. There is no doubt whatever that there has been an actual decrease in the hazards

of pregnancy and childbirth throughout the United States, and that the wives of industrial wage-earners' families have shared largely in this decline.

Other Diseases

Other diseases which show noteworthy improvements in their death rates, as compared with the first quarter of last year, are scarlet fever,

Death Rates per 100,000 Persons Exposed. First Quarter of 1938 and 1937 Compared. By Color for Principal Causes of Death. All Ages. Metropolitan Life Insurance Company. Industrial Weekly Premium-Paying Business*

Causes of Death	Death Rates per 100,000 Persons Exposed*					
	Total		White		Colored	
	Jan.-Mar. 1938	Jan.-Mar. 1937	Jan.-Mar. 1938	Jan.-Mar. 1937	Jan.-Mar. 1938	Jan.-Mar. 1937
Total—All Causes	851.0	979.5	780.7	900.0	1,401.2	1,603.2
Typhoid fever	.8	.5	.7	.5	1.2	.8
Communicable diseases of childhood	8.7	8.9	9.3	9.1	4.0	7.2
Measles	2.9	1.0	3.1	1.1	1.4	.4
Scarlet fever	1.9	2.5	2.1	2.7	.2	.4
Whooping cough	1.7	3.2	1.8	3.1	1.2	4.3
Diphtheria	2.2	2.2	2.3	2.3	1.2	2.1
Influenza and pneumonia	92.0	168.8	82.3	149.8	168.2	318.0
Influenza	13.4	46.8	11.3	40.3	30.1	97.6
Pneumonia (all forms)	78.6	122.0	71.0	109.5	138.1	220.4
Bronchopneumonia	30.4	46.7	29.1	44.7	40.6	62.1
Lobar and undefined	48.2	75.4	41.9	64.8	97.4	158.3
Tuberculosis (all forms)	47.7	56.9	36.4	44.0	136.0	157.6
Tuberculosis of respiratory system	43.4	51.7	33.1	39.8	124.3	145.1
Syphilis, locomotor ataxia, and general paralysis of the insane	12.0	11.7	7.2	7.1	49.1	47.5
Cancer (all forms)	94.9	95.9	93.5	95.5	105.7	99.5
Diabetes mellitus	26.9	30.2	26.8	29.9	27.9	32.6
Alcoholism	1.9	1.8	1.8	1.6	2.8	3.9
Cerebral hemorrhage; apoplexy	64.1	66.8	54.9	59.0	135.6	127.9
Diseases of the heart†	169.4	185.4	155.0	170.7	282.4	300.6
Diseases of the coronary arteries	35.1	33.7	35.9	34.6	28.7	27.2
Angina pectoris	8.0	9.6	7.9	9.6	8.3	9.7
Diarrhea and enteritis	5.6	5.2	5.6	5.0	5.5	6.8
Appendicitis	10.3	10.9	10.3	10.9	10.5	10.7
Chronic nephritis (Bright's disease)	58.2	62.2	50.7	54.4	117.2	123.6
Puerperal state—total	6.3	7.1	5.9	6.5	9.5	11.8
Total external causes	60.0	65.0	56.4	61.2	87.7	95.3
Suicides	8.6	8.7	9.0	8.9	5.5	7.0
Homicides	4.7	4.9	2.3	2.5	23.0	23.7
Accidents—total	46.7	51.4	45.1	49.8	59.2	64.6
Automobile accidents	18.0	20.4	17.2	20.2	23.9	21.5
All other diseases and conditions	149.1	158.7	140.0	150.6	220.7	222.4

*The rates for 1937 and 1938 are subject to slight correction, since they are based on provisional estimates of lives exposed to risk.

†Excludes pericarditis, acute endocarditis, acute myocarditis, coronary artery diseases, and angina pectoris.

whooping cough, diabetes, heart disease, and chronic nephritis. Smaller declines are in evidence for cancer, cerebral hemorrhage, and appendicitis. Measles and diseases of the coronary arteries are the only conditions to show important increases in the death rate this year as compared with last.

Violent Deaths

A slight drop in suicides has occurred, which, if maintained throughout the year, will extend the continuous decline which has been going on since 1932. Homicides also have been fewer than during the first quarter of 1937. For accidents (all forms) a 9 percent drop has been registered, and for automobile fatalities the decline in the cumulative mortality rate has amounted to 12 percent.

Whooping Cough the Most Intractable of Childhood Diseases

AT THE beginning of the 20th century every one of the four principal communicable diseases of childhood (measles, scarlet fever, whooping cough, and diphtheria) was an important cause of death, whereas, at the present time, each is a minor cause. Diphtheria, in the five-year period 1900-1904, so far outranked the three others that it caused more deaths than did all three combined. With a death rate in excess of 40 per 100,000 population, in the year 1900, this disease just escaped inclusion among the 10 leading causes of death in the country.*

With the passing of more than one third of the century, however, the picture has changed. Not only have the death rates from these diseases been materially reduced, but there has also been a change in their relative rank. Whooping cough is now the leader and takes a toll of three lives to every two charged to diphtheria. The following table shows the death rates from each of these diseases for the five-year periods 1931 to 1935 and 1900 to 1904.

Average Death Rates per 100,000
For the Principal Communicable Diseases of Children.
Original Registration States.
1931-1935 and 1900-1904.

CAUSE OF DEATH	1931 to 1935	1900 to 1904
Measles	2.0	10.0
Scarlet fever	2.1	11.8
Whooping cough	2.9	10.7
Diphtheria	2.0	32.8

*In an area consisting of 10 States and the District of Columbia. Reliable data on the mortality from individual causes of death are not available for the rest of the United States for the year 1900.

The gains that have been made in reducing the death rate for all four of these diseases of childhood constitute one of the greatest achievements in the history of public health in America. The objective toward which the health agencies are working, however, is the complete suppression of all four; and whooping cough seems to be the one against which the campaign now needs most to be developed and expanded. The fight against diphtheria has succeeded chiefly as the result of immunization against the disease. Convalescent sera and toxins have proved to be useful adjuncts in the treatment and prevention of measles and scarlet fever; but further research is called for, particularly in the case of whooping cough—research in the development of diagnostic methods, standard immunization procedures, and therapeutic measures to lessen the duration and the severity of the disease.

And, supplementing the potential gains that purely medical research may still accomplish, there is much more to be done by way of stimulating cooperation of parents in applying the simple measures of control of whooping cough which health officials advocate. Too many parents are still ignorant of the fact that whooping cough is a highly contagious disease and a dangerous one—more especially to babies, as six out of every 10 deaths from this disease occur in the very first year of life. The precaution of keeping babies away from those who cough or appear to have colds applies with double force when whooping cough prevails in the community. Equally, it is the duty of parents whose children have contracted whooping cough, to protect others from contact with their children.

Most important of all is to call in a physician when whooping cough is suspected, and to follow his directions in order that complications, and especially those of a pulmonary type, may be avoided; for, in nine out of every 10 deaths which are charged every year to whooping cough, it is bronchial pneumonia that is the immediate cause of death.

Health Record for March 1938

THE death rate of 8.4 per 1,000 for the month of March 1938 is more than 12 percent below the March average for the three years immediately preceding, and is the lowest figure ever recorded for that month among the Metropolitan Industrial policyholders.

March is the month in which it is expected that the highest, or next to the highest, death rate of the year will be registered—a rate commonly far in excess of the average for the year as a whole. Yet, the March rate in 1938 was lower than any year-round average except one in the last 10 years. The record for this month is a signal example of the remarkably favorable health conditions now prevailing among insured

wage-earners in the United States and Canada.

Reports of mortality for the population in general are also very favorable. The number of deaths recorded in 86 large cities of the United States in March was more than 7 percent below the March average for the last three years. Aside from an unusually high incidence of measles and smallpox, there has been no widespread prevalence of any of the epidemic diseases. Measles cases, according to reports from 38 States and the District of Columbia, rose from 125,338 in February to 168,196 in March. The number of cases in March was more than five times that reported in the same month of 1937. Smallpox cases exceeded the number reported in March, a year ago, by more than 50 percent.

Items of special public health interest recently reported are as follows: A medical center is to be established in conjunction with the University of Alabama and the State Mental Hospitals, through an endowment of $10,000,000 provided by the Rockefeller and Carnegie Foundations. The Health Section of the World Federation of Education Associations has received a grant from the W. W. Kellogg Foundation to be used in collecting data on specific school health problems in various parts of the world.

The Zachary Smith Reynolds Foundation, Inc., has allotted the income from $7,000,000 to the North Carolina State Board of Health to aid in the prevention and cure of syphilis. A survey of the health problems of the District of Columbia has been launched by the United States Public Health Service and will be under the direction of the Assistant Surgeon General with the cooperation of 10 or more Service experts already located in Washington. A special study of the tuberculosis problem is planned. The Rockefeller Foundation has appropriated $66,000 for research on chronic disease to be conducted by the Department of Hospitals at the hospital now under construction at Welfare Island, New York City.

The following table shows the mortality among Industrial policyholders for March 1938, February 1938, and March 1937, together with the death rates for the first three months of each year.

METROPOLITAN LIFE INSURANCE COMPANY

Death Rate per 100,000 for Principal Causes. Weekly Premium-Paying Business in Industrial Department. All Ages (Annual Basis).*

MONTHS OF MARCH 1938, FEBRUARY 1938, AND MARCH 1937

CAUSES OF DEATH	ANNUAL RATE PER 100,000 LIVES EXPOSED*				
	March 1938	February 1938	March 1937	Cumulative January-March	
				1938	1937
TOTAL—ALL CAUSES	835.2	867.9	962.8	851.0	979.5
Typhoid fever	.9	.5	.5	.8	.5
Measles	3.9	2.7	1.3	2.9	1.0
Scarlet fever	1.9	2.0	2.8	1.9	2.5
Whooping cough	1.7	1.7	4.2	1.7	3.2
Diphtheria	1.3	2.3	1.7	2.2	2.2
Influenza	10.6	15.1	46.3	13.4	46.8
Tuberculosis (all forms)	49.2	49.3	58.0	47.7	56.9
Tuberculosis of respiratory system	44.1	44.7	52.6	43.4	51.7
Syphilis, locomotor ataxia, and general paralysis of the insane	11.6	11.9	11.3	12.0	11.7
Cancer (all forms)	93.3	94.7	95.1	94.9	95.9
Diabetes mellitus	26.5	26.1	27.8	26.9	30.2
Cerebral hemorrhage; apoplexy	62.2	65.8	66.3	64.1	66.8
Diseases of the heart†	169.3	169.4	177.9	169.4	185.4
Diseases of the coronary arteries	33.8	36.7	31.1	35.1	33.7
Angina pectoris	7.3	9.1	8.9	8.0	9.6
Pneumonia (all forms)	74.5	81.1	109.4	78.6	122.0
Diarrhea and enteritis	4.8	6.1	5.6	5.6	5.2
Appendicitis	11.0	9.7	10.4	10.3	10.9
Chronic nephritis (Bright's disease)	55.4	58.8	63.3	58.2	62.2
Puerperal state—total	6.0	6.6	7.5	6.3	7.1
Suicides	9.9	7.8	9.7	8.6	8.7
Homicides	4.6	4.7	5.3	4.7	4.9
Accidents—total	42.7	45.2	43.9	46.7	51.4
Automobile accidents	15.7	16.9	15.9	18.0	20.4
All other diseases and conditions	152.9	160.6	174.5	151.0	160.6

*The rates for 1937 and 1938 are subject to slight correction, since they are based on provisional estimates of lives exposed to risk.

†Excludes pericarditis, acute endocarditis, acute myocarditis, coronary artery diseases, and angina pectoris.

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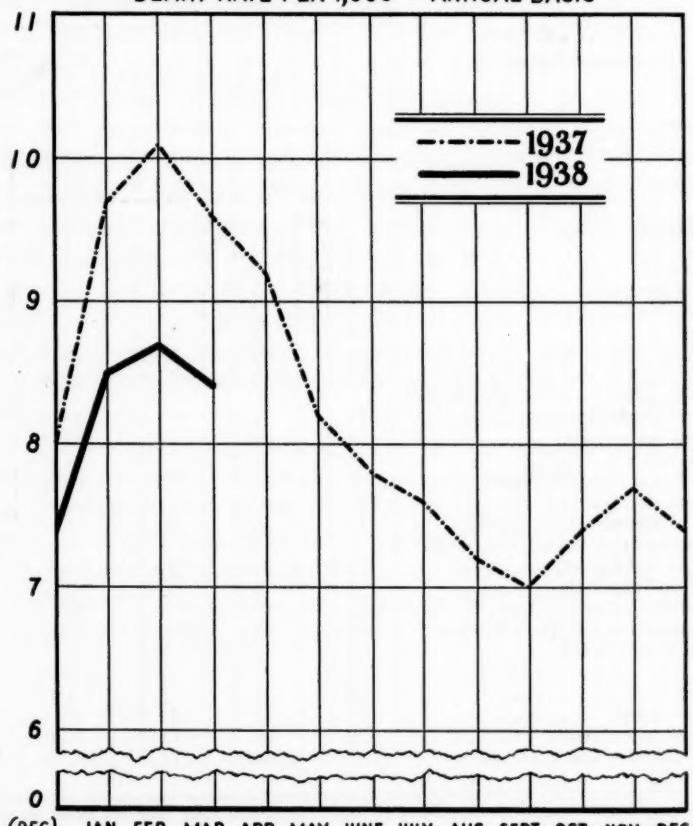
DEATH RATES FROM ALL CAUSES

METROPOLITAN LIFE INSURANCE COMPANY
INDUSTRIAL DEPARTMENT
WEEKLY PREMIUM-PAYING BUSINESS – TOTAL PERSONS

DEATH RATE PER 1,000 – ANNUAL BASIS



(DEC)	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1937	9.7	10.1	9.6	9.2	8.2	7.8	7.6	7.2	7.0	7.4	7.7	7.4
1938	8.5	8.7	8.4									

Rates are provisional

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